

Application S.N. 10/596,289

March 5, 2009

Reply to the Office Action dated December 2, 2008

Page 2 of 10

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-9 (canceled).

Claim 10 (currently amended): A directional coupler comprising:
a first dielectric layer;
a second dielectric layer; and
two line electrodes arranged on each of the first and second dielectric layers;
wherein

the two line electrodes include an inner line electrode and an outer line electrode that surrounds the inner line electrode, as viewed from above, such that only some sections of the inner line electrode oppose some sections of the outer line electrode and remaining sections of the inner line electrode do not oppose remaining sections of the outer line electrode;

a first end of the inner line electrode arranged on the first dielectric layer and a first end of the inner line electrode arranged on the second dielectric layer are connected through a first via hole in the first dielectric layer;

a first end of the outer line electrode arranged on the first dielectric layer and a first end of the outer line electrode arranged on the second dielectric layer are connected through a second via hole in the first dielectric layer; and

corresponding currents are transmitted in the same direction through sections of the inner line electrode and the outer line electrode that are adjacent and substantially parallel to each other.

Claim 11 (currently amended): A directional coupler comprising:

a first dielectric layer;

a second dielectric layer; and

two line electrodes arranged on each of the first and second dielectric layers;

wherein

the two line electrodes include a spiral-shaped or helical-shaped inner line electrode and a spiral-shaped or helical-shaped outer line electrode that surrounds the inner line electrode, as viewed from above, such that only some sections of the inner line electrode oppose some sections of the outer line electrode and remaining sections of the inner line electrode do not oppose remaining sections of the outer line electrode;

a first end of the inner line electrode arranged on the first dielectric layer and a first end of the inner line electrode arranged on the second dielectric layer are connected through a first via hole in the first dielectric layer; and

a first end of the outer line electrode arranged on the first dielectric layer and a first end of the outer line electrode arranged on the second dielectric layer are connected through a second via hole in the first dielectric layer.

Claim 12 (previously presented): The directional coupler according to Claim 10, further comprising a third dielectric layer and an inner line electrode arranged on the third dielectric layer, wherein a second end of the inner line electrode arranged on the first dielectric layer and a first end of the inner line electrode arranged on the third dielectric layer are connected through a third via hole in the third dielectric layer

Claim 13 (previously presented): The directional coupler according to Claim 10, wherein a length of each of the inner line electrode and the outer line electrode is less than a quarter of a wavelength.

Claim 14 (previously presented): The directional coupler according to Claim 10, wherein a width of the inner line electrode is smaller than a width of the outer line electrode.

Claim 15 (previously presented): The directional coupler according to Claim 10, wherein a number of turns of the inner line electrode is larger than a number of turns of the outer line electrode.

Claim 16 (previously presented): The directional coupler according to Claim 10, wherein the inner line electrode and the outer line electrode are arranged on the same plane.

Claim 17 (previously presented): The directional coupler according to Claim 10, wherein the inner line electrode and the outer line electrode are arranged on different planes.

Claim 18 (previously presented): The directional coupler according to Claim 10, wherein at least one of the inner line electrode and the outer line electrode is divided into line electrode components arranged on a plurality of planes, and the divided line electrode components are connected in series with each other through the first or the second via hole.

Claim 19 (previously presented): The directional coupler according to Claim 10, further comprising a fourth dielectric layer and a ground electrode arranged on the fourth dielectric layer, wherein a capacitance is formed between the ground electrode and ends of the inner line electrode and the outer line electrode.

Claim 20 (previously presented): The directional coupler according to Claim 11, further comprising a third dielectric layer and an inner line electrode arranged on the third dielectric layer, wherein a second end of the inner line electrode arranged on the first dielectric layer and a first end of the inner line electrode arranged on the third

dielectric layer are connected through a third via hole in the third dielectric layer

Claim 21 (previously presented): The directional coupler according to Claim 11, wherein a length of each of the inner line electrode and the outer line electrode is less than a quarter of a wavelength.

Claim 22 (previously presented): The directional coupler according to Claim 11, wherein a width of the inner line electrode is smaller than a width of the outer line electrode.

Claim 23 (previously presented): The directional coupler according to Claim 11, wherein a number of turns of the inner line electrode is larger than a number of turns of the outer line electrode.

Claim 24 (previously presented): The directional coupler according to Claim 11, wherein the inner line electrode and the outer line electrode are arranged on the same plane.

Claim 25 (previously presented): The directional coupler according to Claim 11, wherein the inner line electrode and the outer line electrode are arranged on different planes.

Claim 26 (previously presented): The directional coupler according to Claim 11, wherein at least one of the inner line electrode and the outer line electrode is divided into line electrode components arranged on a plurality of planes, and the divided line electrode components are connected in series with each other through the first or the second via hole.

Application S.N. 10/596,289

March 5, 2009

Reply to the Office Action dated December 2, 2008

Page 6 of 10

Claim 27 (previously presented): The directional coupler according to Claim 11, further comprising a fourth dielectric layer and a ground electrode arranged on the fourth dielectric layer, wherein a capacitance is formed between the ground electrode and ends of the inner line electrode and the outer line electrode.